

Appln. No. 10/643,661

Attorney Docket No. DKT01053

II. Remarks

Claims 1 through 20 are pending in the application. Claims 1 through 14 have been withdrawn. Claims 15 and 19 have been amended. Claims 21 through 25 have been added.

Accordingly, claim 15 through 25 are now under consideration.

Rejection Under 35 USC § 102

The Examiner rejected claims 15, 17 and 18 under 35 U.S.C. § 102(b) as being anticipated by Boggs III, United States Patent No. 5,898,249 (Boggs, III). Applicants' attorney contravenes this conclusion based upon the Boggs III reference. Boggs, III is directed to an eddy current slip clutch which also includes a positive locking device. As the specification of Boggs, III describes, a typical eddy current, i.e., electromagnetic, coupling is essentially incapable of providing a positive coupling between input and output. That is, there will always be a slight speed differential: the output will always rotate more slowly than the input. Because of this inefficiency, it may be necessary to size the drive motor larger to compensate for it, and, in any event, power will be lost because of it. See column 1, lines 35 through 61 of Boggs, III.

In addition to the eddy current clutch, therefore, Boggs, III also includes a positive, i.e., locking, clutch in parallel with the eddy current clutch. This locking clutch may be engaged to eliminate the power losses and inefficiency noted above. To achieve these two functions, Boggs III utilizes a first electromagnetic drive coil 45 and a second electromagnetic lock-up coil 81. These coils are independently provided with electrical energy.

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The Examiner's characterization of Boggs, III is not understood. The Examiner asserts that Boggs includes, *inter alia*, a first rotatable member 11 with teeth, a second rotary member 17 with teeth, a clutch collar 27, a permanent magnet 41, 43, an induction member 25, etc.

First of all, Applicants disclose and claim a clutch configuration distinct from Boggs, III. Applicants' clutch includes a first rotatable member having axially extending teeth which are engaged by and along which a clutch collar axially translates. As such, they are clearly not the face teeth taught by Boggs, III. Additionally, the component the Examiner has characterized as the clutch collar (27) of Boggs, is in fact merely a feature of the first rotatable member 11 and moves with it. Applicants' claimed device is manifestly distinct from Boggs, III in that it includes, and the claims recite, three specific clutch components: two rotatable members and an axially moveable clutch collar which selectively couples them.

Most significant and most at odds with the teaching of Boggs, III is the Examiner's characterization of the inner and outer pole pieces 41 and 43. The Examiner characterizes them, without apparent support, as permanent magnets. Nothing in Boggs suggests that these pole pieces are or should be considered permanent magnets. Rather, they provide a path for the magnetic field generated by the electromagnetic drive coil 45 (see column 4, lines 27 through 47). If the pole pieces 41 and 43 were permanent magnets, the Boggs, III eddy current clutch would permanently and constantly provide some level of coupling between the input and the output. This performance is obviously undesirable as the device is intended to achieve a quantum of coupling corresponding to the electrical current provided to the coil 45. If there is no current, there should be no coupling and hence no output.

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Clearly the Examiner's characterization of the pole pieces 41 and 43 as permanent magnets is both unsupported and inimical to the operation of the Boggs, III device.

Lastly, the Boggs, III device includes a pair of electromagnetic coils 45 and 81 neither of which can fairly be characterized as permanent magnets and neither of which find their analog in Applicants' claimed device. With regard to the eddy current electromagnetic coil 45, only manifestly different, fixed strength permanent magnets are evident in Applicants' device. With regard to the lock-up electromagnetic coil 81, engagement of Applicants' clutch collar is achieved by a shift operator which is not recited in the subject claims presently under discussion.

In summation, it is apparent that Boggs, III certainly does not anticipate nor, given the manifest distinctions between Boggs and Applicants' claimed device, render the claims obvious. Withdrawal of the rejection on Boggs, III of claim 15, 17 and 18 under 35 U.S.C. § 102(b) is respectfully requested.

Rejections Under 35 USC § 103

Claim 20 was rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 5,898,249 issued to Boggs, III (Boggs, III) in view of U.S. Patent No. 5,848,678 issued to Johnston, et al. (Johnston). Boggs, III has been discussed and distinguished above and such text is hereby incorporated in its entirety by reference. Johnston is accurately characterized by its title: "Passive Magnetorheological Clutch." The Johnston clutch is preferably utilized to drive a radiator fan in a motor vehicle. The clutch incorporates a heat sensitive thermal actuator 47 to adjust the position of a rotor 39 bearing an annular permanent magnet 35 which is surrounded by a frustoconical ferromagnetic ring 36. These components are disposed within a cavity 24 containing a magnetorheological fluid (not illustrated). Axial translation of

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the rotor 39 caused by axial motion of the thermal actuator 47 increases or decreases the magnetic flux coupling and the viscosity of the magnetorheological fluid thereby increasing or decreasing the coupling between the input and the output of the clutch.

At the outset, it should be noted that this is a passive, self contained device having no external input or control features beyond the ambient temperature sensed by the thermal actuator 47. It is also a pure slip clutch as there is no parallel positive clutch such as appears in both Boggs, III and Applicants' device. As such, it is a defined application device wherein the degree of coupling is controlled solely by the ambient temperature and wherein positive lock-up is unavailable.

Johnston does utilize an annular permanent magnet 35 but this is in conjunction with a magnetorheological fluid. No such fluid resides in either Applicants' device or Boggs, III.

Given the diverse configurations, of Boggs, III and Johnston it should come as no surprise that neither reference contains any explicit or implicit suggestion to combine or modify one by the other. Accordingly, the two references represent little beyond clutches utilizing magnetic operators and they in no way render Applicants' claimed device obvious. This piecemeal, hindsight rejection by the Examiner should be withdrawn and claim 20 passed to issue.

By way of this Amendment, Applicants have added claims 21 through 25 for the Examiner's consideration. Such claims are similar to claims 15 through 20 and the arguments presented above supporting the patentability of claims 15, 17 and 18 are incorporated by reference and offered in support of the patentability of claims 21 through 25.

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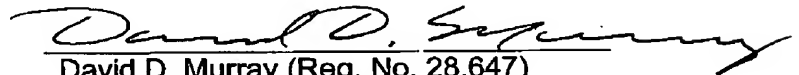
The undersigned thanks the Examiner for the objected to status and thus indication of allowability of dependent claims 16 and 19. Nonetheless, and as apparent from the foregoing, it is the undersigned's belief that claim coverage significantly broader than that achieved by objected to claim 19 is appropriate.

SUMMARY

Pending Claims 15 through 25 as amended, are patentable. Applicants respectfully request the Examiner grant allowance of these claims. The Examiner is invited to contact the undersigned attorneys for the Applicants via telephone if such communication would expedite this application.

Respectfully submitted,

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Date


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